6,175,950 9958060

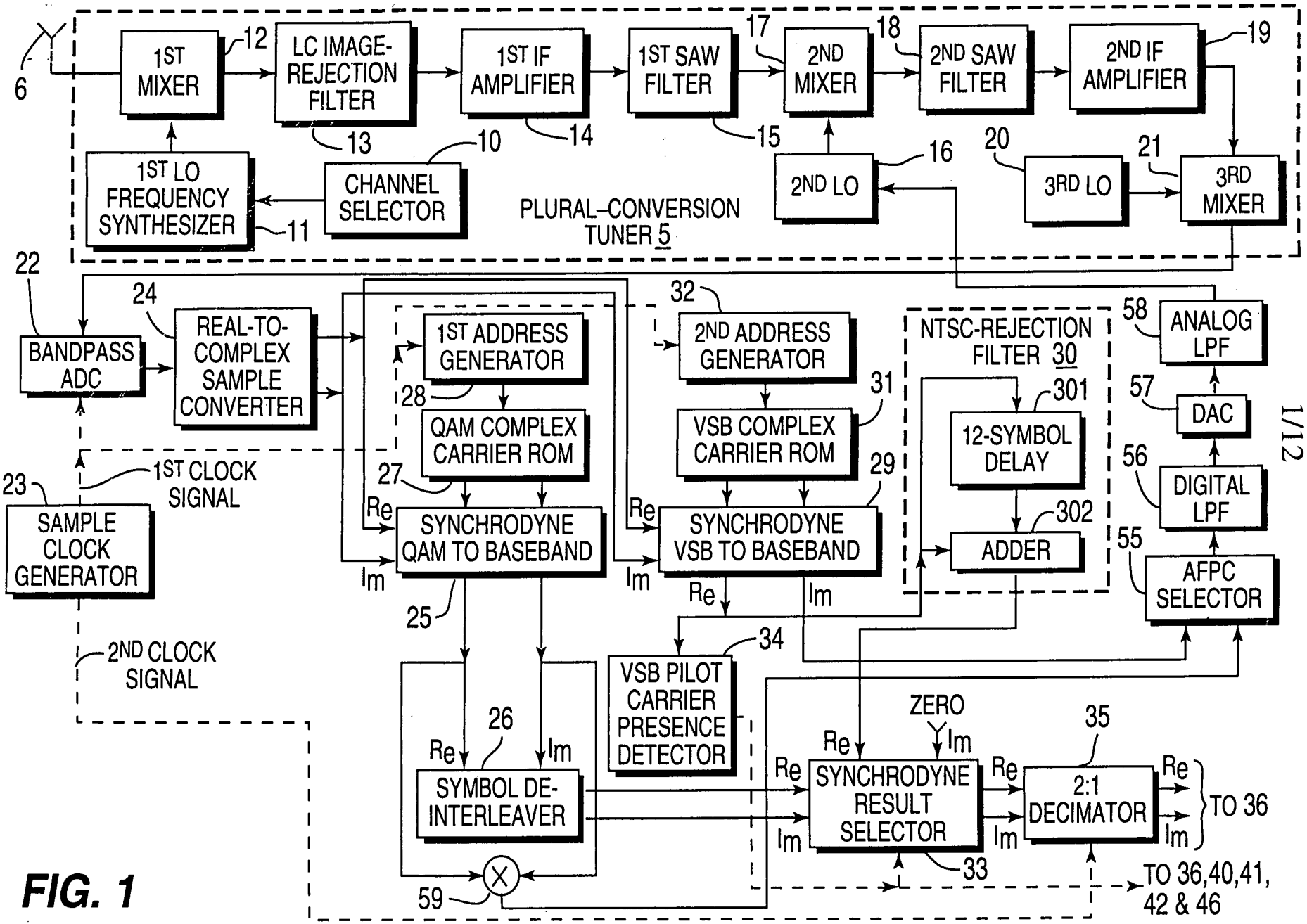

FIG. 1

1/12

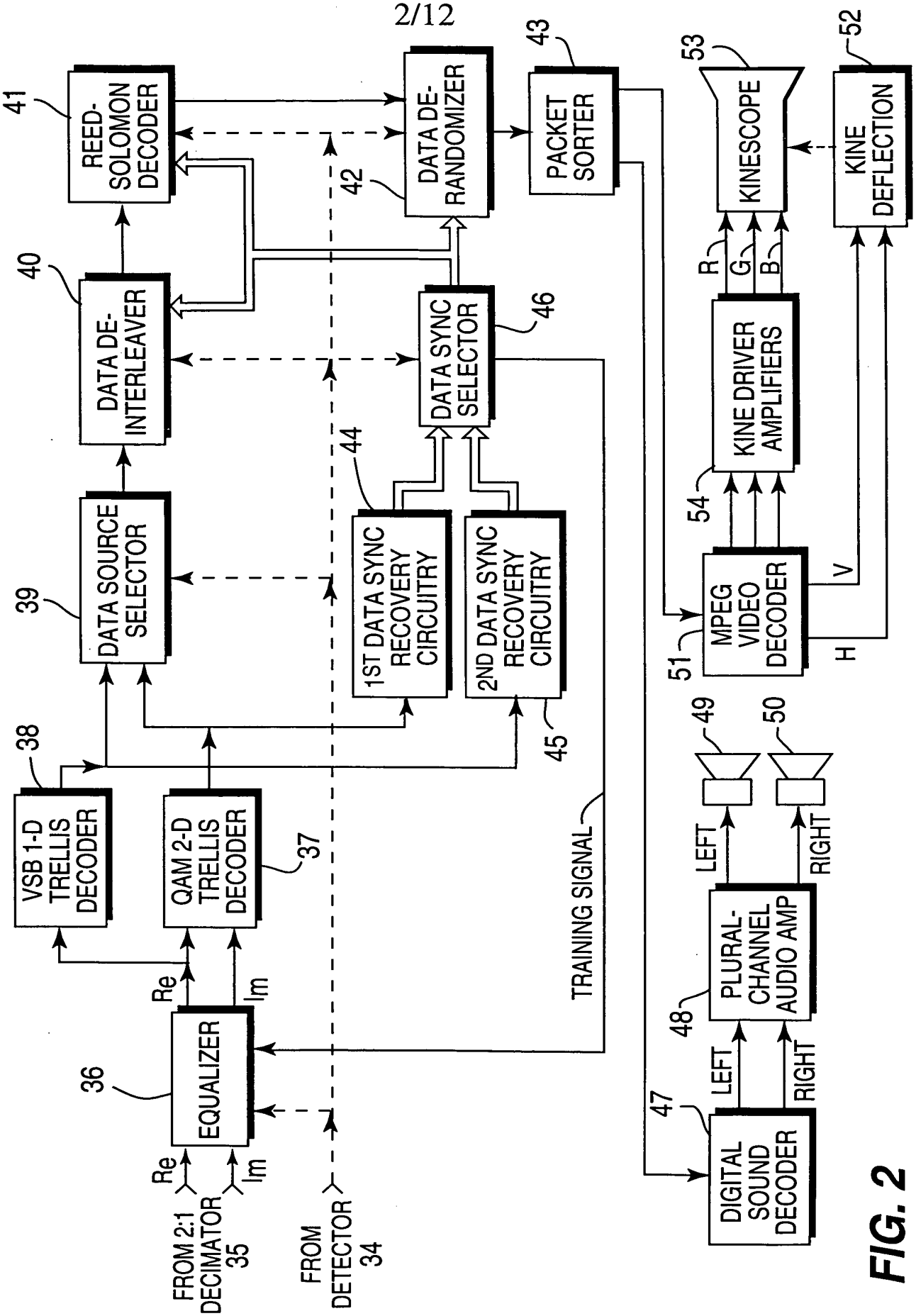
FROM 2:1 DECIMATOR 35
FROM DETECTOR 34
Re
Im
36
EQUALIZER
37
QAM 2-D TRELLIS DECODER
38
VSB 1-D TRELLIS DECODER
39
DATA SOURCE SELECTOR
40
DATA DE-INTERLEAVER
41
REED-SOLOMON DECODER
42
DATA DE-RANDOMIZER
43
PACKET SORTER
44
1ST DATA SYNC RECOVERY CIRCUITRY
45
2ND DATA SYNC RECOVERY CIRCUITRY
46
DATA SYNC SELECTOR
TRAINING SIGNAL
47
DIGITAL SOUND DECODER
48
PLURAL-CHANNEL AUDIO AMP
LEFT
RIGHT
49
50
51
MPEG VIDEO DECODER
52
KINE DEFLECTION
53
KINESCOPE
54
KINE DRIVER AMPLIFIERS
R
G
B
V
H

FIG. 2

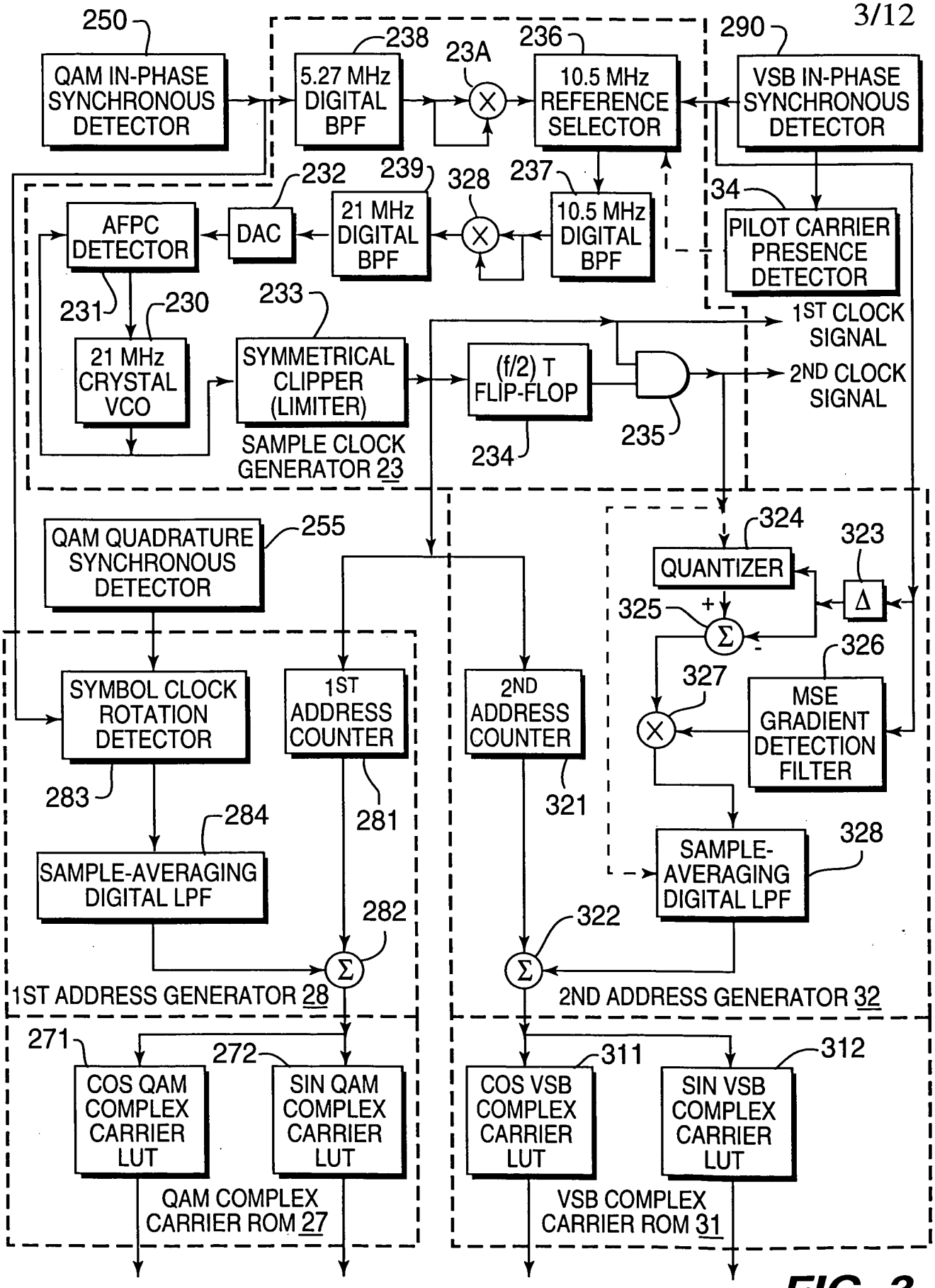
250
QAM IN-PHASE SYNCHRONOUS DETECTOR
238
5.27 MHz DIGITAL BPF
23A
236
10.5 MHz REFERENCE SELECTOR
290
VSB IN-PHASE SYNCHRONOUS DETECTOR
232
AFPC DETECTOR
DAC
239
21 MHz DIGITAL BPF
328
237
10.5 MHz DIGITAL BPF
34
PILOT CARRIER PRESENCE DETECTOR
231
230
21 MHz CRYSTAL VCO
233
SYMMETRICAL CLIPPER (LIMITER)
(f/2) T FLIP-FLOP
234
235
1ST CLOCK SIGNAL
2ND CLOCK SIGNAL
SAMPLE CLOCK GENERATOR 23
255
QAM QUADRATURE SYNCHRONOUS DETECTOR
324
QUANTIZER
323
Δ
325
+
Σ
-
326
327
MSE GRADIENT DETECTION FILTER
SYMBOL CLOCK ROTATION DETECTOR
1ST ADDRESS COUNTER
2ND ADDRESS COUNTER
283
281
321
284
SAMPLE-AVERAGING DIGITAL LPF
328
SAMPLE-AVERAGING DIGITAL LPF
282
322
Σ
Σ
1ST ADDRESS GENERATOR 28
2ND ADDRESS GENERATOR 32
271
272
311
312
COS QAM COMPLEX CARRIER LUT
SIN QAM COMPLEX CARRIER LUT
COS VSB COMPLEX CARRIER LUT
SIN VSB COMPLEX CARRIER LUT
QAM COMPLEX CARRIER ROM 27
VSB COMPLEX CARRIER ROM 31

FIG. 3

SUBHARMONIC OF 43.04 MHz	SUBHARMONIC OF 21.52 MHz	FREQUENCY IN MHz	SUBHARMONIC -2.375 MHz
8	4	5.380	3.005
9		4.782	2.407
10	5	4.304	1.929
11		3.913	1.538
12	6	3.587	1.212
13		3.311	0.936
14	7	3.074	0.699
15		2.869	0.494
16	8	2.690	0.315
17		2.532	0.157
18	9	2.391	0.015
19		2.265	−0.110
20	10	2.152	
21		2.050	
22	11	1.956	
23		1.871	
24	12	1.793	
25		1.722	
26	13	1.655	
27		1.594	
28	14	1.537	
29		1.484	
30	15	1.435	
31		1.388	
32	16	1.345	
33		1.304	
34	17	1.266	
35		1.230	
36	18	1.196	
37		1.163	

FIG. 4

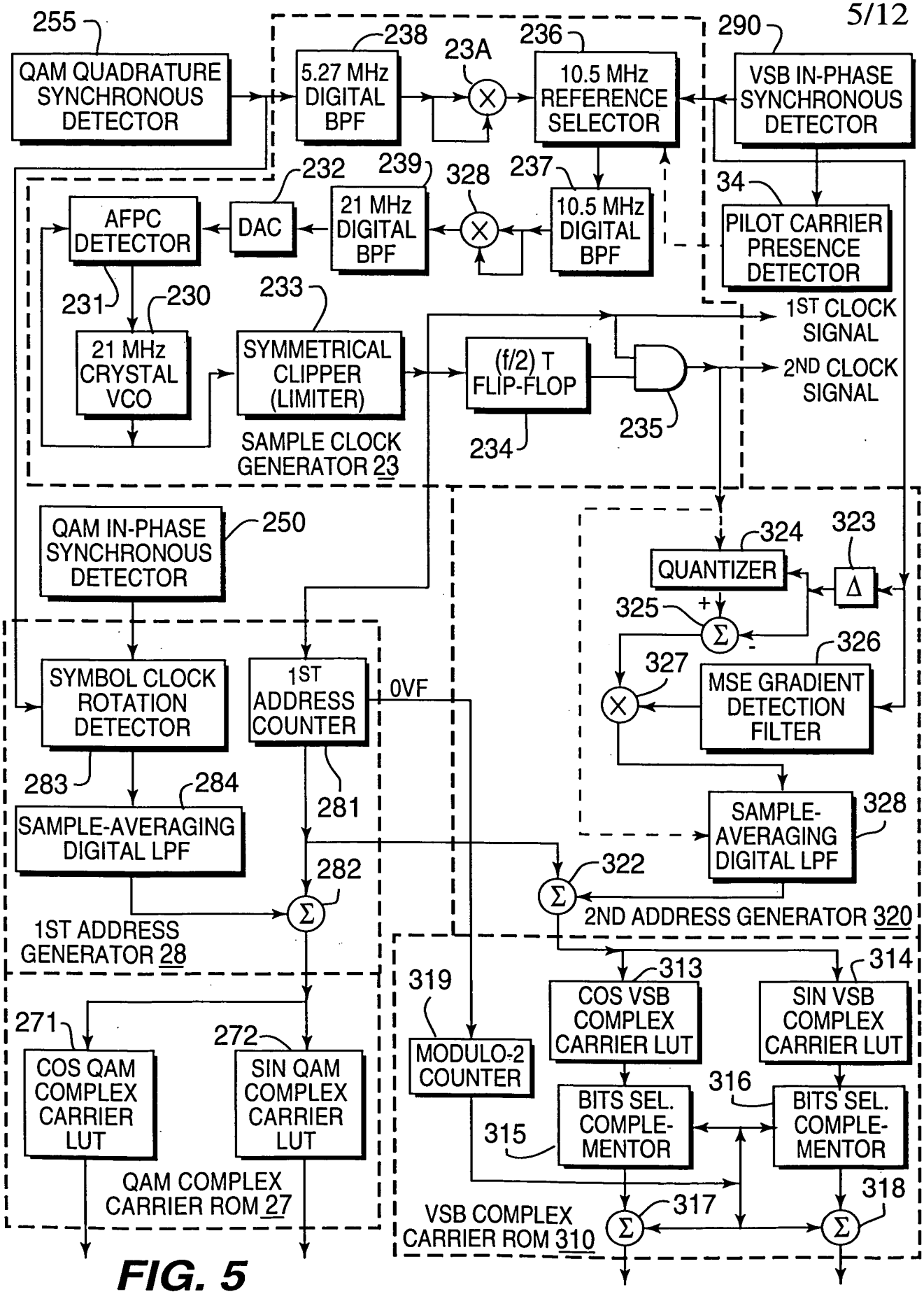
255
QAM QUADRATURE SYNCHRONOUS DETECTOR
238
5.27 MHz DIGITAL BPF
23A
236
10.5 MHz REFERENCE SELECTOR
290
VSB IN-PHASE SYNCHRONOUS DETECTOR
232
AFPC DETECTOR
DAC
239
21 MHz DIGITAL BPF
328
237
10.5 MHz DIGITAL BPF
34
PILOT CARRIER PRESENCE DETECTOR
231
230
21 MHz CRYSTAL VCO
233
SYMMETRICAL CLIPPER (LIMITER)
(f/2) T FLIP-FLOP
234
235
1ST CLOCK SIGNAL
2ND CLOCK SIGNAL
SAMPLE CLOCK GENERATOR 23
QAM IN-PHASE SYNCHRONOUS DETECTOR
250
QUANTIZER
324
323
Δ
325
+
-
326
327
MSE GRADIENT DETECTION FILTER
SYMBOL CLOCK ROTATION DETECTOR
1ST ADDRESS COUNTER
0VF
283
284
281
SAMPLE-AVERAGING DIGITAL LPF
328
282
322
1ST ADDRESS GENERATOR 28
2ND ADDRESS GENERATOR 320
319
313
314
COS VSB COMPLEX CARRIER LUT
SIN VSB COMPLEX CARRIER LUT
271
272
MODULO-2 COUNTER
316
BITS SEL. COMPLE-MENTOR
315
COS QAM COMPLEX CARRIER LUT
SIN QAM COMPLEX CARRIER LUT
317
318
QAM COMPLEX CARRIER ROM 27
VSB COMPLEX CARRIER ROM 310

FIG. 5

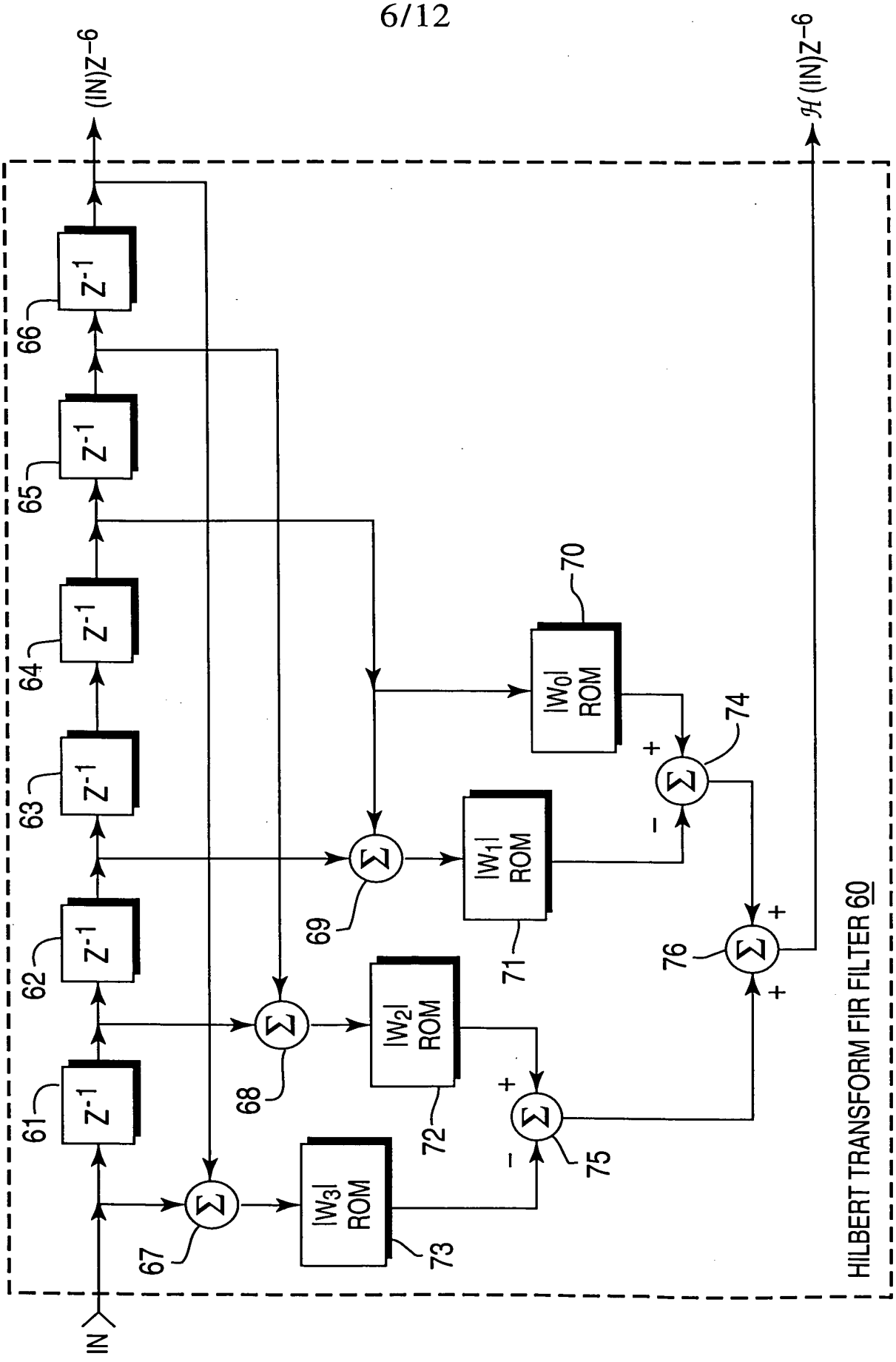
IN
HILBERT TRANSFORM FIR FILTER 60
(IN)Z-6
$\mathcal{H}$(IN)Z-6
Z-1
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
|W0| ROM
|W1| ROM
|W2| ROM
|W3| ROM
Σ
+
–

FIG. 6

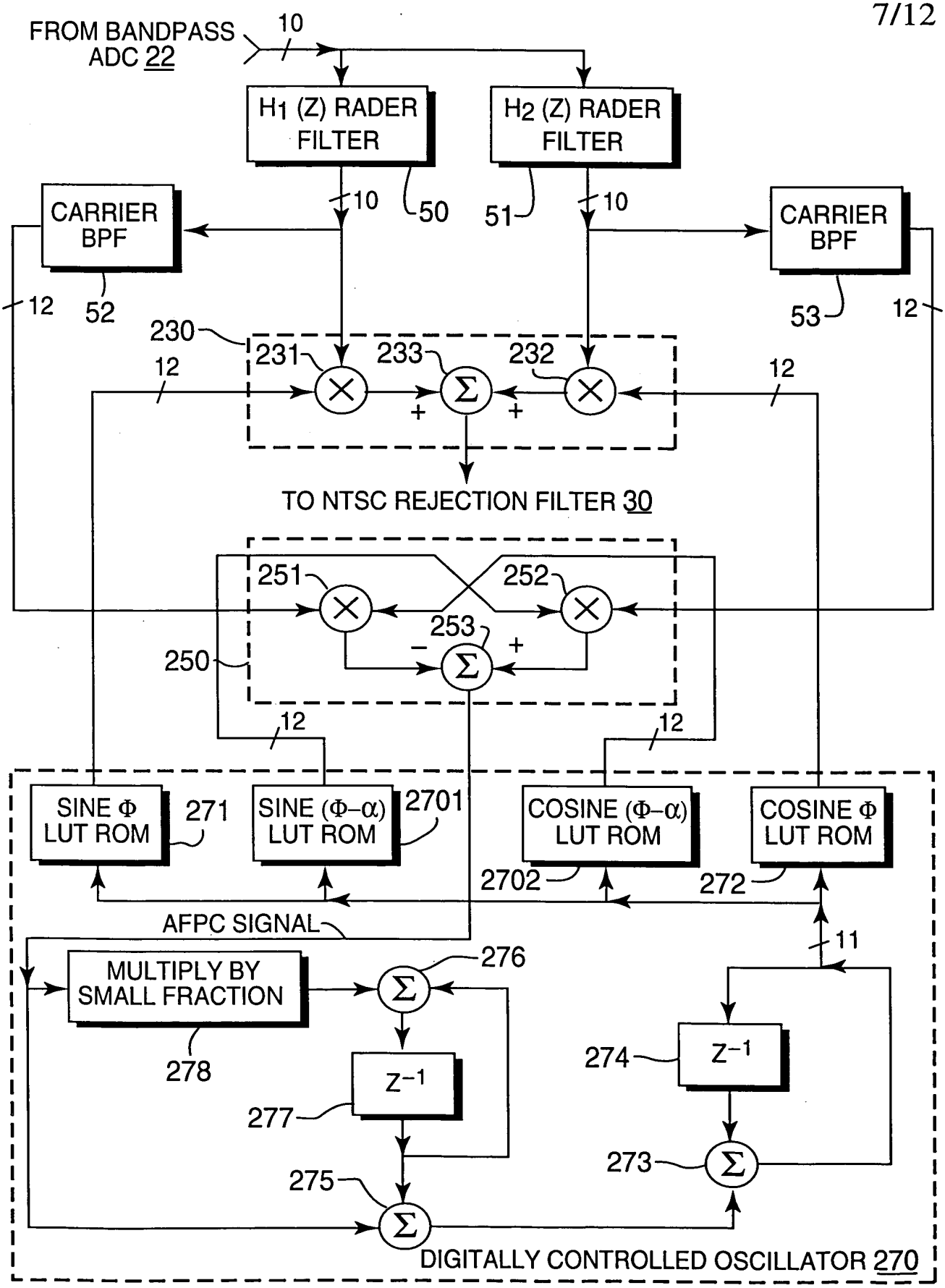
FROM BANDPASS ADC 22
10
H1 (Z) RADER FILTER
H2 (Z) RADER FILTER
CARRIER BPF
CARRIER BPF
10
50
51
52
53
12
230
231
233
232
TO NTSC REJECTION FILTER 30
251
252
253
250
SINE Φ LUT ROM
271
SINE (Φ–α) LUT ROM
2701
COSINE (Φ–α) LUT ROM
2702
COSINE Φ LUT ROM
272
AFPC SIGNAL
MULTIPLY BY SMALL FRACTION
278
276
277
275
274
273
11
DIGITALLY CONTROLLED OSCILLATOR 270

FIG. 7

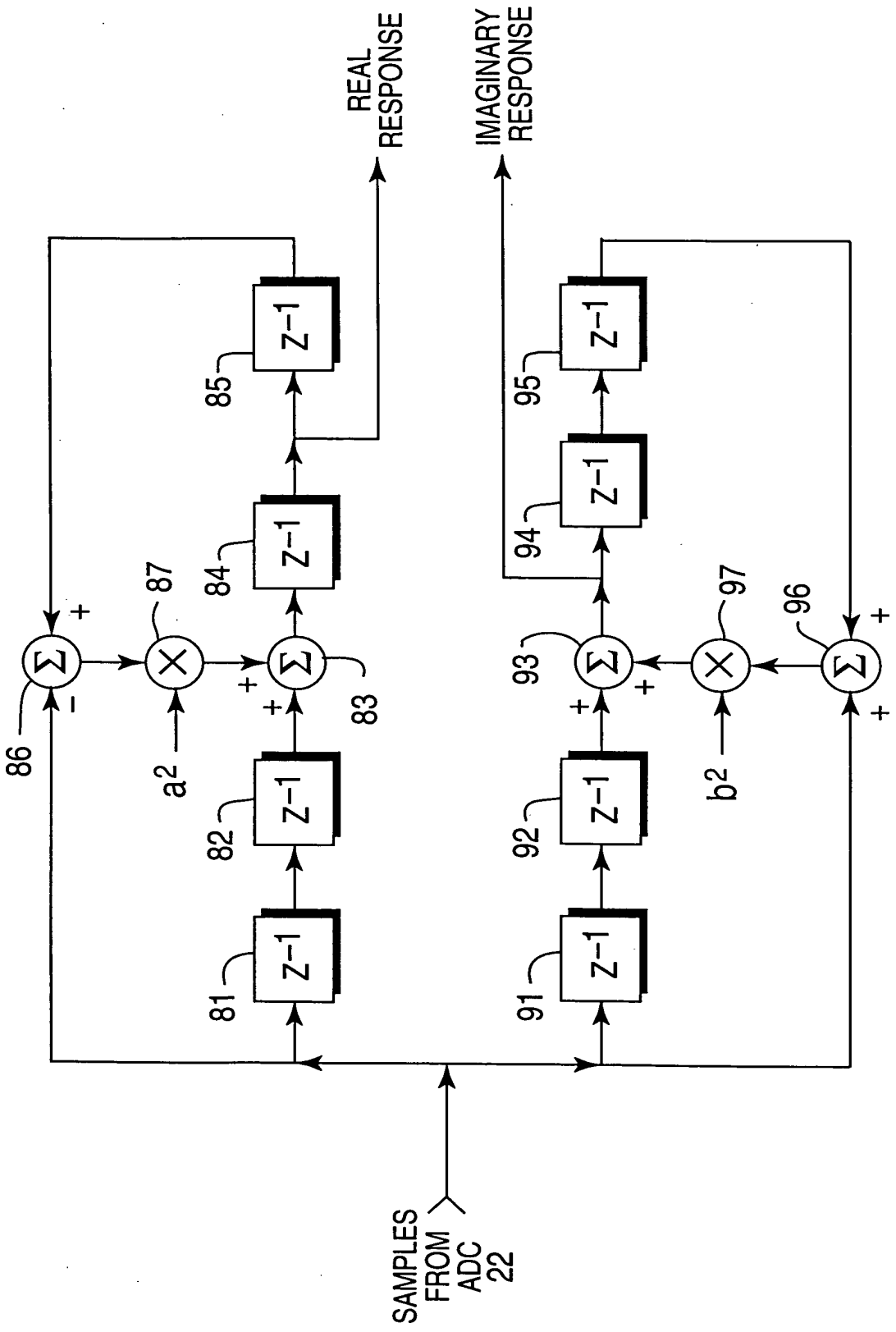
REAL RESPONSE
IMAGINARY RESPONSE
SAMPLES FROM ADC 22
Z-1
81
82
83
84
85
86
87
91
92
93
94
95
96
97
a2
b2
Σ
+
-

FIG. 8

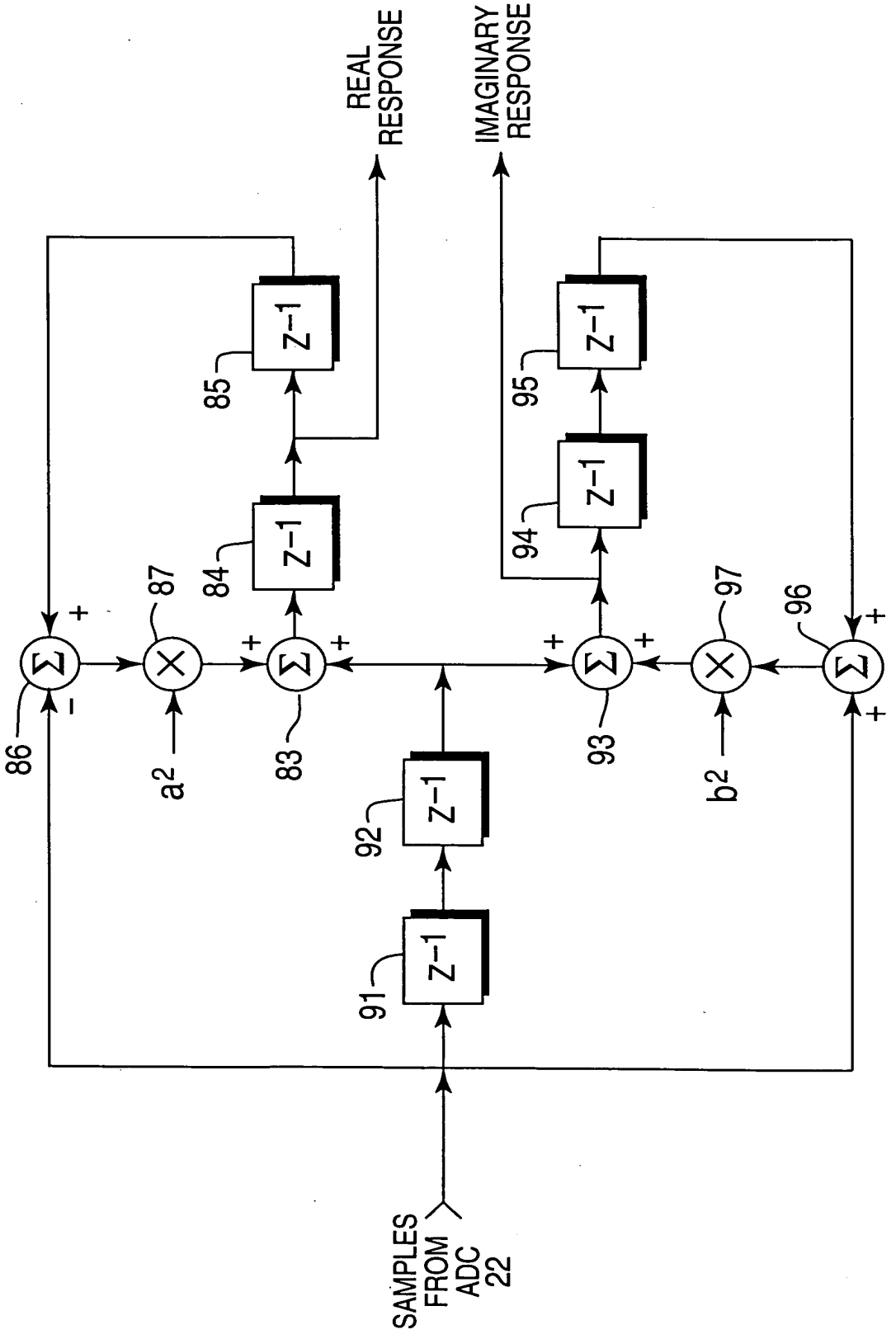
REAL RESPONSE
IMAGINARY RESPONSE
SAMPLES FROM ADC 22
Z-1
91
92
93
94
95
84
85
83
Σ
86
87
a2
b2
96
97

FIG. 9

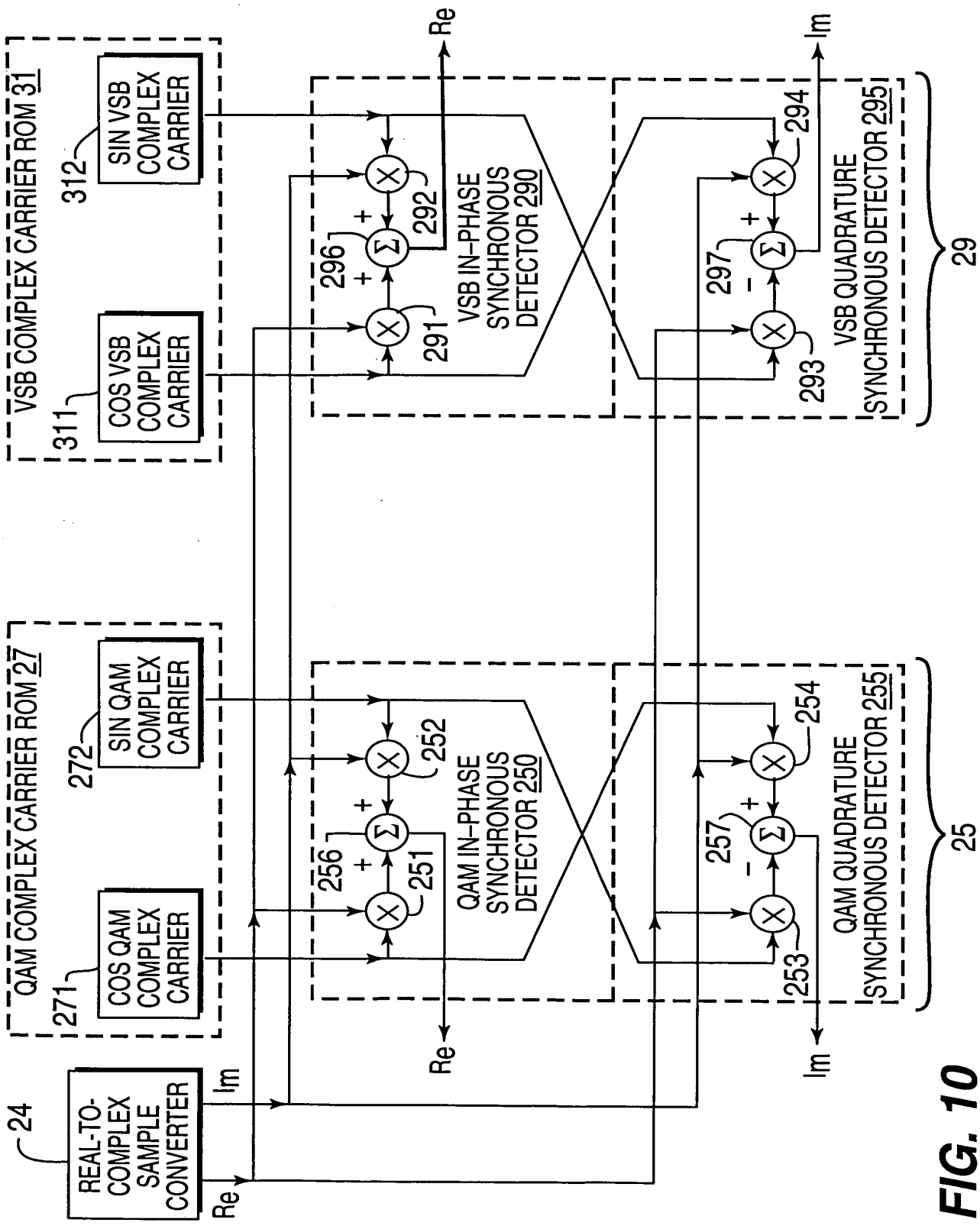
24
REAL-TO-COMPLEX SAMPLE CONVERTER
Re
Im
QAM COMPLEX CARRIER ROM 27
271
COS QAM COMPLEX CARRIER
272
SIN QAM COMPLEX CARRIER
VSB COMPLEX CARRIER ROM 31
311
COS VSB COMPLEX CARRIER
312
SIN VSB COMPLEX CARRIER
QAM IN-PHASE SYNCHRONOUS DETECTOR 250
251
252
256
QAM QUADRATURE SYNCHRONOUS DETECTOR 255
253
254
257
25
VSB IN-PHASE SYNCHRONOUS DETECTOR 290
291
292
296
VSB QUADRATURE SYNCHRONOUS DETECTOR 295
293
294
297
29

FIG. 10

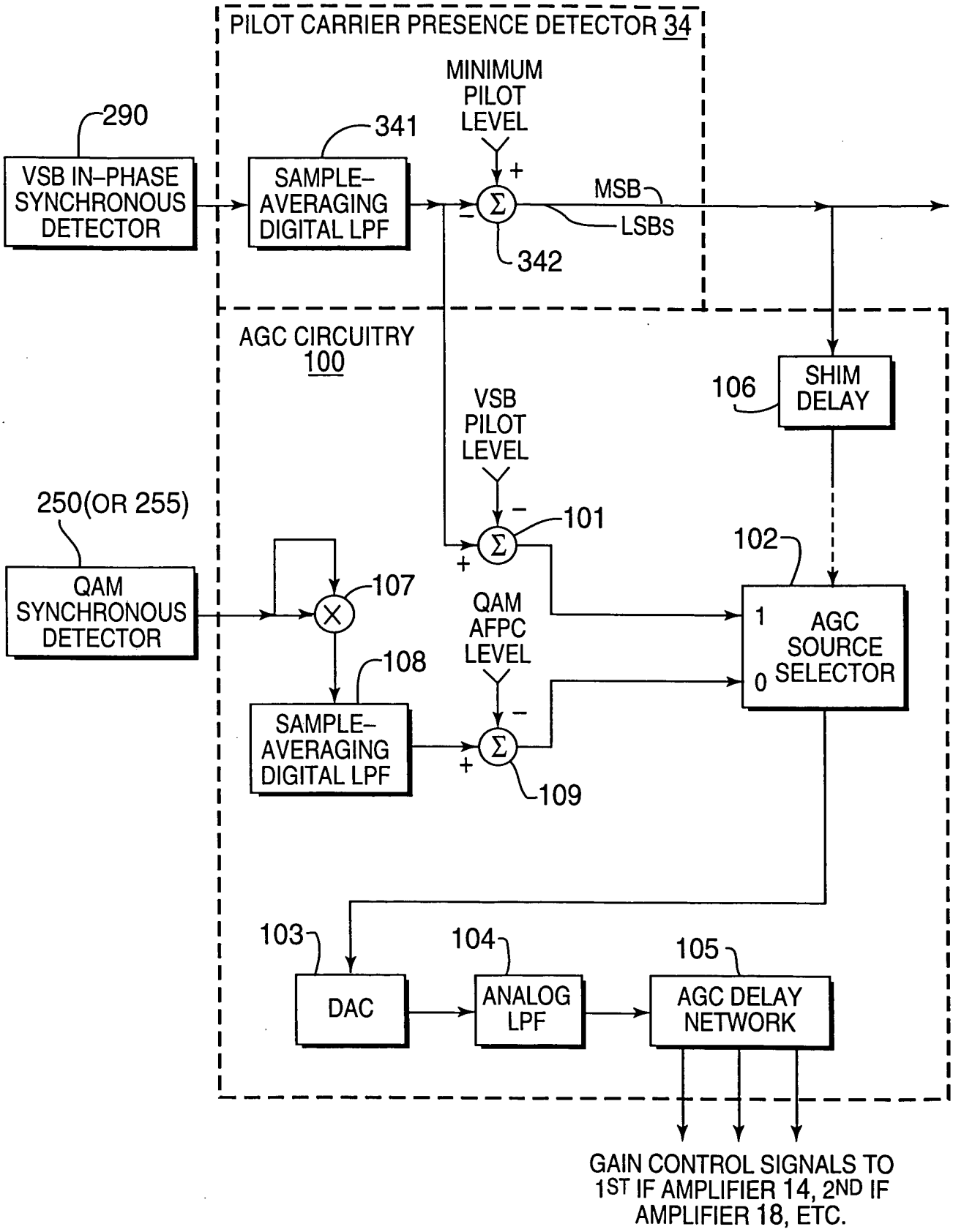
PILOT CARRIER PRESENCE DETECTOR 34
MINIMUM PILOT LEVEL
290
341
VSB IN-PHASE SYNCHRONOUS DETECTOR
SAMPLE-AVERAGING DIGITAL LPF
+
MSB
LSBs
342
AGC CIRCUITRY 100
106
SHIM DELAY
VSB PILOT LEVEL
250(OR 255)
101
102
QAM SYNCHRONOUS DETECTOR
107
QAM AFPC LEVEL
1
AGC SOURCE SELECTOR
0
108
SAMPLE-AVERAGING DIGITAL LPF
109
103
104
105
DAC
ANALOG LPF
AGC DELAY NETWORK
GAIN CONTROL SIGNALS TO 1ST IF AMPLIFIER 14, 2ND IF AMPLIFIER 18, ETC.

FIG. 11

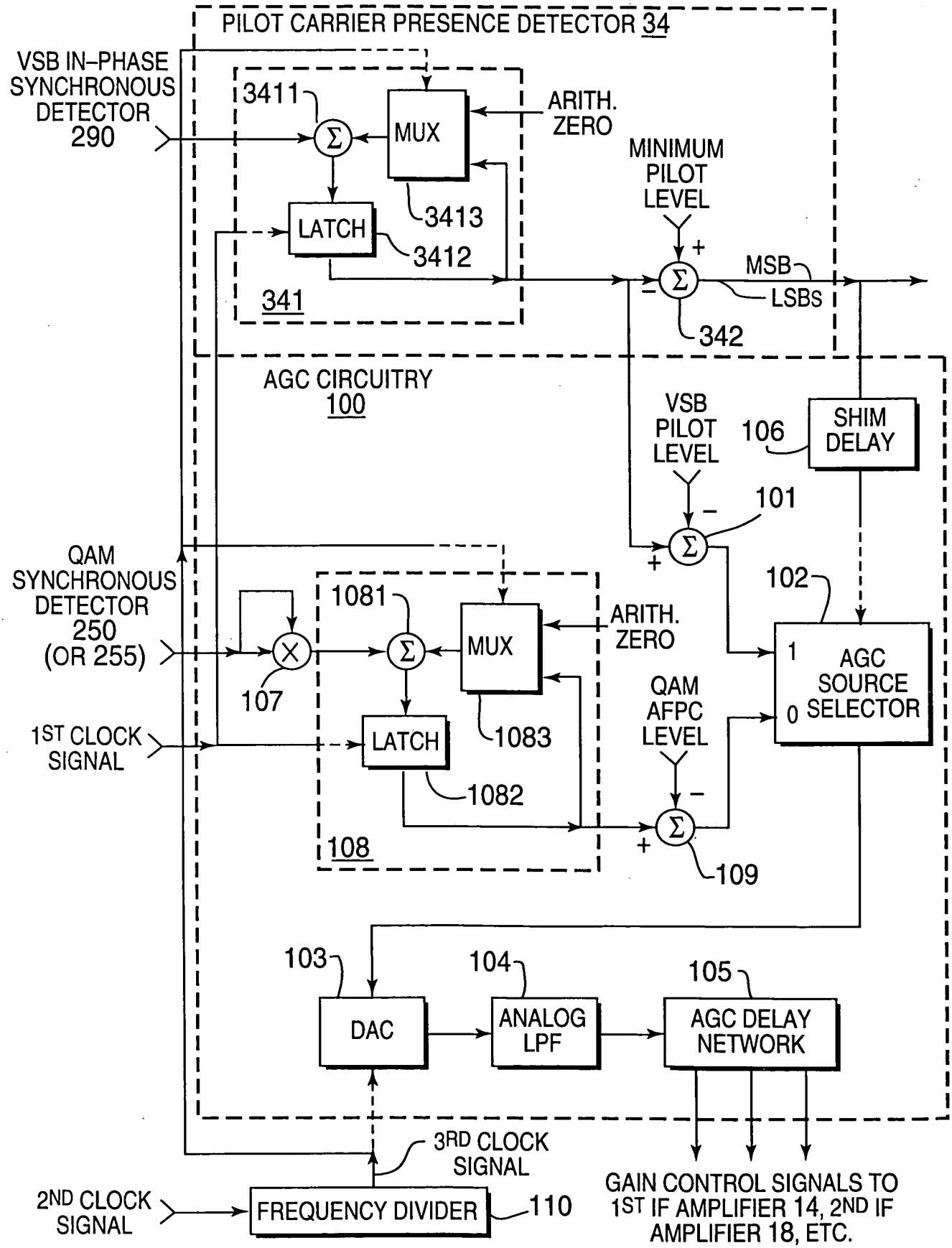
PILOT CARRIER PRESENCE DETECTOR 34
VSB IN-PHASE SYNCHRONOUS DETECTOR 290
3411
MUX
ARITH. ZERO
LATCH
3413
3412
341
MINIMUM PILOT LEVEL
+
MSB
LSBs
342
AGC CIRCUITRY 100
VSB PILOT LEVEL
106
SHIM DELAY
101
QAM SYNCHRONOUS DETECTOR 250 (OR 255)
1081
MUX
ARITH. ZERO
102
1
AGC SOURCE SELECTOR
0
107
1ST CLOCK SIGNAL
LATCH
1083
QAM AFPC LEVEL
1082
108
109
103
104
105
DAC
ANALOG LPF
AGC DELAY NETWORK
3RD CLOCK SIGNAL
2ND CLOCK SIGNAL
FREQUENCY DIVIDER
110
GAIN CONTROL SIGNALS TO 1ST IF AMPLIFIER 14, 2ND IF AMPLIFIER 18, ETC.

FIG. 12